UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

GAETANO DEVELOPMENT CORP., GATEWAY IV, LLC, and HARTFORD FIRE INSURANCE COMPANY a/s/o Gateway IV, LLC,	:	Case No. 09-CV-10090 (Consolidated)
Plaintiffs,	:	
-against-	:	
GOODMAN MANUFACTURING COMPANY, L.P., GOODMAN COMPANY, L.P. and GOODMAN GLOBAL, INC.,	:	
Defendants.	:	
GOODMAN COMPANY, L.P.,	:	
Third-Party Plaintiff,	:	
-against-	:	
TOWER MANUFACTURING CORPORATION,	:	
Third-Party Defendant.	:	
TOWER MANUFACTURING CORPORATION,	:	
Second Third-Party Plaintiff,	:	
-against-	:	
EVEREX COMMUNICATIONS, INC., PRIME TECHNOLOGY (GUANGZHOU), INC., CONNECTICUT PTAC SERVICES, LLC, and COOL TECH HVAC SERVICE, LLC	:	
Second Third-Party Defendants.	:	

AFFIDAVIT OF ANDREW J. NEUHALFEN, PH.D., P.E.

Andrew J. Neuhalfen, Ph.D., P.E.; being duly sworn, states the following under penalty of perjury:

1. I hold a Ph.D. degree in Materials Science and Engineering from Northwestern University (1992). I also hold a B.S. degree in Electrical Engineering from the University of Illinois at Urbana-Champaign (1983). I am currently the President and Chief Technical Officer of Neuhalfen Engineering Corporation, Inc. A copy of my curriculum vitae is attached.

2. I was retained on behalf of Tower Manufacturing Corporation to investigate and evaluate the causes of three fires at a building located in New York City, New York on March 27, 2009, May 18, 2009 and February 1, 2009. Attached hereto and incorporated herein as part of this affidavit is a copy of my report dated February 8, 2011 containing my findings and opinions from that investigation. All opinions set forth are to a reasonable degree of engineering certainty.

Andrew J. Neuhalfen, Ph.D., P.E.
Neuhalfen Engineering Corporation, Inc.

Sworn to before me this
25 th day of February, 2011

Elizabeth E. Hunter
Notary Public

OFFICIAL SEAL
ELIZABETH E HUNTER
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES:03/12/12

GAETANO v. GOODMAN MFG CO

NE10240

To:

Barry Gerstman, Esq.
Haworth, Coleman & Gerstman, L.L.C.
45 Broadway Avenue
21st Floor
New York City, New York 10006

February 8, 2011

GAETANO v. GOODMAN MFG CO

I. INTRODUCTION

Neuhalfen Engineering Corporation, Inc. was retained by Barry Gerstman, Esq. of Haworth, Coleman & Gerstman, L.L.C., with its office located in New York City, New York. Mr. Gerstman has requested that an investigation and evaluation be conducted into the causes of three fire incidences which occurred within three residences of a condominium structure. The three fire incidences occurred on March 27, 2009, May 18, 2009, and February 1, 2010; at the condominium structure identified as "The Lore" located in New York City, New York. Reportedly, the origins of the three fire incidences were determined to be within the Packaged Terminal Air Conditioner / Heat Pump ("PTAC") units within each of the three residences of the condominium structure. The PTAC units were manufactured by the Goodman Manufacturing Company. It has been alleged that the causes of the three fire incidences were attributed to a malfunction or defect within the electrical power cord of the PTAC units. It has been further alleged that an improper crimp connection for the terminal for one of the conductors for the power cord was formed during the manufacture of the power cord for the PTAC units. Reportedly, the power cords were manufactured by the Tower Manufacturing Company.

The investigation and evaluation conducted by Neuhalfen Engineering Corporation, Inc. has included a review and analysis of existing documentation and information related to the three fire incidences, including other reported fire incidences. The investigation and evaluation has also included an analysis of photographs of recovered artifacts associated with the fire incidences, and an analysis of photographs provided within existing documentation and information. This report shall serve as a discussion of my findings and analyses to date.

II. QUALIFICATIONS

Dr. Andrew J. Neuhalfen's qualifications are summarized in his Curriculum Vitae, attached as Appendix A. Dr. Neuhalfen received a Ph.D. degree in Materials Science and Engineering from Northwestern University in Evanston, Illinois, in 1992; and a B.S. degree in Electrical Engineering from the University of Illinois at Urbana-Champaign in 1983. Dr. Neuhalfen is a member of the Institute of Electrical and Electronics Engineers, the American Society of Materials, the International Microelectronics and Packaging Society, the International Association of Arson Investigators, the Illinois Society of Professional Engineers, and the National Fire Protection Association. He has been published in numerous engineering-oriented publications, and he holds a number of patents; all of which are set forth in the Curriculum Vitae. Dr. Neuhalfen is a licensed Professional Engineer through the State of Illinois.

Currently, Dr. Neuhalfen is employed by Neuhalfen Engineering Corporation, Inc. as President and Chief Technical Officer. He has been employed by Neuhalfen Engineering Corporation, Inc. since July 2008. As President and Chief Technical Officer, he is responsible for performing and supervising electrical related accident investigations, manufacturing process control and optimization, evaluation and assessment of intellectual property issues, product assessments, and failure analysis of electrical and electronic systems. During the time period from 1998 to 2008, Dr. Neuhalfen was employed by Packer Engineering, Inc. as Senior Vice President. As Senior Vice President of Packer Engineering, Inc., he was responsible for directing the activities of the Electrical Engineering Department; as well as performing and supervising electrical related accident investigations, applied research, manufacturing process control and optimization, evaluation and assessment of intellectual property issues, product assessments, and failure analysis of electrical and electronic systems. During the time period from 1992 to 1998, Dr. Neuhalfen was employed by Littelfuse, Inc. as the Engineering Manager of the Advanced Materials Development Department; and during the time period from 1983 to 1988, he was employed by Motorola, Inc. as a Development Engineer. Neuhalfen Engineering Corporation, Inc. is compensated $400 per hour for the services rendered by Dr. Neuhalfen.

III. BACKGROUND INFORMATION

It was my understanding that three fire incidences occurred within three residences at the condominium structure identified as "The Lore". Reportedly, the dates and residences of the three fire incidences were March 27, 2009, in Unit #2B; May 18, 2009, in Unit #PHB; and February 1, 2010, in Unit #4B. The location of the condominium structure was 261 West 112th Street in New York City, New York. Reportedly, the three fire incidences had originated within three PTAC units which were located within various rooms for the residences of the condominium structure.

It was my further understanding that the PTAC units comprised various components and assemblies. The PTAC units were manufactured by the Goodman Manufacturing Company. The PTAC units incorporated a control board and a power cord. The control board that was incorporated into the PTAC units was designed and manufactured by Everex, Inc., and Prime Technology. The power cord was utilized to supply electrical power to the PTAC unit. The control board for the PTAC unit is comprised of a double sided printed circuit board with thin layers of copper metal and a glass fiber resin substrate. The printed circuit board for the PTAC unit incorporates thin layers of copper metal corresponding to the traces and the pads for the circuitry of the control board. The copper traces and pads of the printed circuit board are separated by the surface of the substrate that comprised the printed circuit board. The control board also incorporated various components and terminal lugs. The components and terminal lugs of the control board were soldered to the printed circuit board to establish electrical connections and mechanical support for the components to the substrate of the printed circuit board. The copper traces and pads of the printed circuit board provided electrical interconnections between the components and terminal lugs on the printed circuit board. The terminal lugs for the control board provided for the attachment of electrical conductors. The

electrical conductors that were attached to the terminal lugs of the control board provided electrical interconnections to internal components and assemblies of the PTAC unit and the external source of electrical power.

The PTAC units also incorporated an electrical power cord that was manufactured by the Tower Manufacturing Company. The power cord provided the electrical interconnection between the external electrical power supply, and the control board and assemblies within the PTAC unit. The power cord for the PTAC units comprised a three conductor cord set with stranded copper conductors. The stranded copper conductors consisted of color coded insulation, which comprised the black conductor, the white conductor, and the green conductor. A leakage current detector interrupter ("LCDI") assembly was also incorporated into the construction of the power cord. One end of the power cord consisted of a three prong plug assembly for insertion into an external electrical receptacle. The electrical receptacle would supply 240 Vac electrical power to the PTAC unit when in service. The other end of the power cord consisted of terminations for attachment to the control board and assemblies within the PTAC unit. The terminations were crimp type connectors on the ends of the stranded copper conductors of the power cord. Three types of crimp connectors were utilized in the assembly of the power cord for the PTAC unit. The black conductor utilized a flag style crimp connector, the white conductor utilized a straight style crimp connector, and the green conductor utilized a ring style crimp connector. All three styles of crimp connectors would utilize a compression fitting between the strands of the copper conductors and the metal barrel of the crimp connector.

The power cord is attached to the PTAC unit utilizing the three crimp style terminations on the ends of the three conductors of the power cord. The black conductor of the power cord would be attached to the control board of the PTAC unit utilizing the flag style crimp connector. The flag style crimp connector for the black conductor on the end of the power cord is inserted into a solder mounted terminal lug that is attached to the control board of the PTAC unit. The solder mounted terminal lug is attached to the control board at a layer of metal that had been identified as the LINE 2 pad on the printed circuit board. The straight style crimp connector for the white conductor on the end of the power cord would be attached to the lug on the terminal of a capacitor within the PTAC unit. The capacitor is utilized for the operation of the compressor motor for the PTAC unit. The compressor motor for the PTAC unit is attached to the control board at the solder mounted terminal lug on a layer of metal that had been identified as the COMPRESSOR pad on the printed circuit board. The LINE 2 pad and the COMPRESSOR pad are positioned adjacent to each other on the printed circuit board of the control board. The LINE 2 pad and the COMPRESSOR pad were separated by a spacing that comprised the surface of the substrate for the printed circuit board of the control board for the PTAC unit. The spacing between the LINE 2 pad and the COMPRESSOR pad on the surface of the substrate for the printed circuit board was approximately 0.08". The green conductor of the power cord would be attached to the metal enclosure for the PTAC unit.

The Consumer Products Safety Commission ("CPSC") had issued a recall for the power cord of certain models of PTAC units. The CPSC recall was issued on August 27, 2008, under Alert #08-602. The PTAC models affected were identified as PTH153B50AM and PTH093B50AM.

The CPSC recall covered a time period for PTAC units manufactured between the dates of February 2007 and June 2008. The CPSC Alert stated "Hazard: The PTAC's power cord can overheat posing a burn or fire hazard." The PTAC units that were reportedly involved in the three fire incidences were sold to Gaetano Developments, owner of "The Lore", on October 31, 2007, and delivered on November 5, 2007. Reportedly, the PTAC unit in Unit #2B had the original power cord attached to the PTAC unit at the time of the fire incident on March 27, 2009. The PTAC units in Unit #PHB and Unit #4B had replacement power cords attached to the PTAC units at the time of the fire incidences on May 18, 2009, and February 1, 2010, respectively.

Several engineering reports and documentation have been provided through counsel for the various parties involved with this matter. The submitted documentation included engineering reports authored by Brian Gsell and dated February 5, 2009 (the "Gsell Report"), James Pryor and dated June 29, 2009 (the "Pryor Report"), Andrew Diamond and dated April 5, 2010 (the "Diamond Report"), Duncan Glover and dated August 31, 2010 (the "Glover Report"), Allan Eberhardt and dated November 30, 2010 (the "Eberhardt Report"), Peter Coste and dated December 15, 2010 (the "Coste Report"), and Eric Heiberg and dated December 15, 2010 (the "Heiberg Report"). These reports and documentation have been reviewed and analyzed. The analyses and opinions offered in the Gsell Report, the Pryor Report, the Diamond Report, the Glover Report, the Eberhardt Report, the Coste Report, and the Heiberg Report will be addressed in this Engineering Report.

IV. DISCUSSION

The analysis and evaluation performed in this investigation addresses the issues related to the causation of the three fire incidences that occurred at "The Lore" on March 27, 2009, May 18, 2009, and February 1, 2010; and the role, if any, of the power cord for the PTAC units as related to the causation of these fire incidences. Further, the analysis and evaluation performed in this investigation addresses the analyses and opinions offered in the Gsell Report, the Pryor Report, the Diamond Report, the Glover Report, the Eberhardt Report, the Coste Report, and the Heiberg Report.

The PTAC units incorporated a control board and a power cord. The printed circuit board for the control board of the PTAC unit has the identifier of M61, and incorporated ten terminals and three relays. The relays operated as switching mechanisms for two heater assemblies and a compressor assembly of the PTAC unit. The power cord for the PTAC unit was comprised of 12 AWG stranded copper conductors. The catalog number for the power cord for the PTAC unit was 30364-0.

The determination of the origin of the fire incidences has been reported as the area between two terminal pads on the printed circuit board for the control board of the PTAC units. The Coste Report opined that "The damage in the Everex M61 Control Boards is located between the copper traces for the LINE2 connection and the COMPRESSOR connection." The area of the origin for the fire incidences were positioned in the gap between two layers of metal comprising

the LINE 2 pad and the COMPRESSOR pad on the printed circuit board for the control board of the PTAC units. The spacing of the gap between the LINE 2 pad and the COMPRESSOR pad of the control board for the PTAC unit was approximately 0.08".

An analysis and evaluation of the photographs of the control boards for the PTAC units that were involved in the fire incidences exhibited damage characteristic of arc tracking between the layers of metal comprising the pads for the printed circuit board. The damage on the control boards was concentrated on the surface of the substrate for the printed circuit board, primarily between the layer of metal comprising the LINE 2 pad and the layer of metal comprising the COMPRESSOR pad for the PTAC unit. Further, it has been described in the documentation that the damage that was evident on the printed circuit board for the control board of the PTAC unit was concentrated between the LINE 2 pad and the COMPRESSOR pad, and underneath the relay for the compressor assembly on the printed circuit board. The analysis and evaluation of the photographs of the control boards for the PTAC units revealed that the insulation of the black conductor for the power cord had not exhibited melt prior to being exposed to heat from an external fire. The photographs depict charred insulation and heat exposure damage to the insulation. The characteristics of the insulation of the black conductor for the power cord for the PTAC unit did not exhibit characteristics of damage associated with heat exposure due to overheating at a crimp terminal. As such, the characteristics of the damage to the insulation of the black conductor for the power cord of the PTAC unit was not associated with the operation of an improper crimp connection.

The analysis and evaluation performed in this investigation has determined that a significant voltage potential difference exists between the metal terminals on the control board that have been identified as the LINE 2 pad and the COMPRESSOR pad, when the PTAC unit is energized. The voltage potential difference is approximately 240 Vac. The presence of the voltage potential difference between the LINE 2 pad and the COMPRESSOR pad on the printed circuit board for the control board of the PTAC unit is due to the 120 Vac provided by the black conductor attached to the LINE 2 pad and the 120 Vac provided by the white conductor attached to the C terminal on the capacitor of the compressor assembly. The conductor from the compressor assembly of the PTAC unit is subsequently attached to the COMPRESSOR pad on the control board of the PTAC unit. The damage that was evident on the substrate of the printed circuit board for the PTAC unit was caused by arc tracking across the surface of the printed circuit board between the LINE 2 pad and the COMPRESSOR pad. The arc tracking process occurs on the control board of the PTAC units between the LINE 2 pad and the COMPRESSOR pad. The arc tracking process is due to significant voltage potential difference applied across the small spacing between the LINE 2 pad and the COMPRESSOR pad when the PTAC unit is energized. The Eberhardt Report opined that "The arcing was caused by inadequate spacing of 240 volt high-current circuits on the control board." Further, the Eberhardt Report opined that "The adjacent COMPRESSOR terminal is at LINE1 voltage, thus the voltage difference between LINE2 and COMPRESSOR is the full line differential of approximately 240 volts…." The process of arc tracking occurred over the surface of the substrate for the printed circuit board of the control board for the PTAC unit at which the voltage potential difference between the pads was approximately 240 Vac. The arc tracking on the printed circuit boards leads to burning of

the control boards of the PTAC units. The inadequacy of the spacing between the LINE 2 pad and the COMPRESSOR pad, and the significant voltage potential difference between the LINE 2 pad and the COMPRESSOR pad, while the PTAC unit was energized, cannot be eliminated as the cause of the three fire incidences.

An analysis and evaluation of the UL 873 Standard has been conducted. The 873 Standard is entitled "Standard for Temperature-Indicating and –Regulating Equipment". The UL 873 Standard established the required spacing between pads of differing voltage levels. The design and construction of the printed circuit board for the control board for the PTAC unit did not conform to the requirements of the UL 873 Standard. The voltage potential difference that existed between the LINE 2 pad and COMPRESSOR pad of the control board when the PTAC unit is energized is 240 Vac. The UL 873 Standard incorporates Table 32.1 and identifies the minimum spacing over a surface between any uninsulated live part and an uninsulated live part of opposite polarity. The requirements of the UL 873 Standard for the minimum spacing over a surface between conductors with a voltage potential difference of 300 V or less is 0.25". As such, the minimum spacing between the LINE 2 pad and the COMPRESSOR pad of the control board of the PTAC unit should be 0.25". The actual spacing between the LINE 2 pad and the COMPRESSOR pad of the control board for the PTAC unit is 0.08". The spacing between the layers of metal for the LINE 2 pad and the COMPRESSOR pad terminations was insufficient for the voltage potential difference that is applied when the PTAC unit is energized. The spacing between the LINE 2 pad and the COMPRESSOR pad does not comply with the UL 873 Standard. The inadequate spacing can lead to the generation of an arc tracking process. The arc tracking was caused by the failure to properly space energized circuits on the printed circuit board for the control board for the PTAC unit. The presence of moisture in the operating environment of the PTAC unit would enhance the arc tracking process on the printed circuit board for the control board of the PTAC unit.

The engineering reports have been reviewed and analyzed. The Gsell Report opined that "The cord assemblies are failing due to improperly assembled crimps. Cross-sections of overheated crimps showed evidence of the wire strands not being in full compression inside the crimp, a necessary condition for proper operation and long term reliability." The Pryor Report opined that the fires were caused by "heat generated by a poor crimp connection on the black power cord conductor's termination." The Diamond Report opined that the "primary failure mode … is attributed to improperly assembled cord crimp connections." The Coste Report opined that "Improper crimping of the terminals on the black wire caused high resistance heating of the LINE 2 terminal. This was the cause of the fires in the Goodman PTAC units in the Lore building." The Heiberg Report opined that "Tower's failure to comply with good manufacturing practices resulted in an inadequate crimp connection between the subject hook-up wire and the AMP terminal." The analysis and evaluation performed in this investigation revealed that the crimp style connections of the black conductor for the power cord for the PTAC units were proper and appropriate. The analysis of the photographs of the cross-sections of the crimp connections for the black conductor of the power cord for the PTAC units revealed adequate compression of the wire strands for the copper conductors within the barrel of the crimp

connection. The deformation of the wire strands of the black conductor was proper for an acceptable and reliable electrical connection and mechanical connection of a crimp terminal.

The Gsell Report further opined that "The heat originating in the failing crimps conducts down the spade lug terminal and into the Line 2 pad, resulting in a breakdown of the insulation properties of the PC board material. This, in turn, allows arcing between the 240 VAC Line 2 and Compressor pads, leading to total failure of the assembly." The Coste Report opined that "Improper crimping of the terminals on the black wire caused high resistance heating of the LINE2 terminal." The analysis and evaluation performed in this investigation revealed that the crimp style connections of the black conductor for the power cord for the PTAC unit were proper and appropriate. The analysis of the photographs of the cross-sections of the crimp connections for the black conductor of the power cord for the PTAC units revealed that there was no evidence of electrical related heating at the crimp connection.

The Coste Report further opined that "At no time is there a condition in which the difference in potential reaches 240 volts between the LINE 2 trace and the COMPRESSOR trace." Further, the Coste Report opined that "Spacing between the LINE 2 trace and the COMPRESSOR trace was not a cause of the three fires in the Goodman PTAC units in the Lore building." The analysis and evaluation performed in this investigation demonstrated that a significant voltage potential difference would be imposed between the LINE 2 pad and the COMPRESSOR pad on the control board for the PTAC unit, when the PTAC unit was energized. The analysis of the electrical schematic of the PTAC unit demonstrated that a significant voltage potential would be imposed between the LINE 2 pad and the COMPRESSOR pad of the control board when the PTAC unit was energized. Additionally, electrical measurements described in the Eberhardt Report demonstrated that a significant voltage potential was imposed between the LINE 2 pad and the COMPRESSOR pad of the control board for the PTAC unit, when the PTAC unit was energized.

The Heiberg Report opined that "The source of the fires was determined to be within the PTAC unit." Further, the Heiberg Report opined that "The cause of the fires was traced to near the black wire connection to the PC Board." The Heiberg Report opined that "Tower failed to comply with AMP's specifications with respect to crimp height." Further, the Heiberg Report opined that "Tower failed to comply with AMP's Specifications with respect to tooling imprint area." The Heiberg Report further opined that "Tower failed to comply with AMP's specifications with respect to tooling selection." The crimp connector attached to the black conductor of the power cord for the PTAC units were proper and adequate. An analysis of the cross-sections of the crimp connections for the power cord of the PTAC units demonstrated good electrical connections and mechanical connections. The crimp connections exhibited good manufacturing practices and quality control procedures for the manufacture of the crimp connections for the black conductor of the power cord for the PTAC units. There was no evidence or characteristics of an improper crimp for the black conductor of the power cord for the PTAC units. An analysis of the documentation has demonstrated good manufacturing practices and quality control procedures were utilized in the manufacture and assembly of the crimp connections to the black conductor of the power cord for the PTAC units. Tower

Manufacturing Company complied with Goodman Manufacturing Company's design specifications.

The analysis and evaluation performed in this investigation of the fire incidences that occurred at "The Lore", demonstrated that the power cord of the PTAC units can be eliminated as a cause of these fire incidences. The analyses and evaluation performed in the investigation of the fire incidences that occurred at "The Lore" also demonstrated that the characteristics of electrical fault activity that was evident on the printed circuit board for the control board of the PTAC units cannot be eliminated as a cause of these fire incidences.

V. CONCLUSIONS

The analysis and evaluation of the investigation performed by Neuhalfen Engineering Corporation, Inc. indicate that the power cord for the PTAC units was not the cause of the fire incidences that occurred at "The Lore". The analysis and evaluation of the investigation revealed that the damage to the power cord for the PTAC units was the result of exposure to the heat generated from an external fire. The following set of conclusions has been developed based upon my review, analysis, and evaluation to date:

1. The crimp connections for the black conductor of the power cord for the PTAC units were proper and adequate. There has been no evidence presented of an improper crimp connection for the black conductor of the power cord for the PTAC units.
2. The analysis and evaluation of the crimp connections for the black conductor of the power cord for the PTAC units has established that the power cord can be eliminated as a cause of the fire incidences that occurred at "The Lore".
3. The spacing between the LINE 2 pad and the COMPRESSOR pad on the printed circuit board for the control board of the PTAC units was inadequate for the voltage potential difference applied to the control board, when the PTAC unit is energized.
4. The presence of a significant voltage potential difference between the LINE 2 pad and the COMPRESSOR pad on the control board for the PTAC unit creates the condition for an arc tracking process.
5. The inadequacy of the spacing between the LINE 2 pad and the COMPRESSOR pad, and the significant voltage potential difference between the pads, of the control board for the PTAC units, while the PTAC unit was energized, cannot be eliminated as the cause of the three fire incidences.
6. The control board for the PTAC units cannot be eliminated as a cause of these fire incidences.
7. Tower Manufacturing Company complied with Goodman Manufacturing Company's design specifications.
8. The power cord for the PTAC units were not unsafe, unreasonably dangerous, nor defective.
9. There was nothing that Tower Manufacturing Company did nor failed to do that contributed to the cause of the fire incidences.

Based upon the analyses and evaluations performed in this investigation, it is my opinion, to within a reasonable degree of engineering certainty, that the power cord for the PTAC units did not play any role in the cause of the fire incidences that occurred at the "The Lore" on March 27, 2009, May 18, 2009, and February 1, 2010. There was nothing that the Tower Manufacturing Company did nor failed to do that contributed to the cause of these fire incidences.

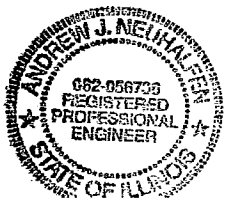
VI. MATERIALS REVIEWED

1. Goodman Mfg. Co. Expert Disclosure
2. Report of Brian Gsell (February 5, 2009)
3. Report of Andrew Diamond (April 5, 2010)
4. Curriculum Vitae of Robert Von Ancken
5. Report of Peter Coste (December 15, 2010)
6. Report of Eric Heiberg (December 15, 2010)
7. Report of Allan Eberhardt (November 30, 2010)
8. Declaration of Chep Rao (July 7, 2010)
9. Report of Duncan Glover (August 31, 2010)
10. Underwriters Laboratories Inspection Report SA13434 (September 27, 2005)
11. Everex Correspondences (April – May 2010)
12. Service Instructions Package Terminal Air Conditioners & Heat Pumps
13. 3CEMS "Analysis Report for Soldering Crack of Goodman M61 Relay Pin"
14. Images of PTAC Units (11 Images)
15. JN-T Relay Specification
16. UL 873 Standard for Safety "Temperature-Indicating and –Regulating Equipment"
17. Supplemental Report of Andrew Diamond (May 12, 2010)
18. Report of James Pryor (June 29, 2009)
19. Deposition Testimony of James Pryor (May 25, 2010)
20. Deposition Testimony Andrew Diamond (May 21, 2010)
21. National Fire Protection Association, NFPA 921, "Guide for Fire and Explosion Investigations", 2008 Edition.
22. Kirk's Fire Investigation; Edited by John D. DeHaan; 6th Edition; 2007.

Neuhalfen Engineering Corporation, Inc. based the above findings upon information obtained and observations made prior to the preparation of this report. Neuhalfen Engineering Corporation, Inc. reserves the right to amend and/or modify this report should additional information become available.

NEUHALFEN ENGINEERING CORPORATION, INC.

Report prepared by:



Andrew J. Neuhalfen, Ph.D., P.E.
Neuhalfen Engineering Corporation, Inc.

APPENDIX A

Andrew J. Neuhalfen, Ph.D., P.E.

President and Chief Technical Officer

PROFESSIONAL EXPERIENCE

2008 - Present NEUHALFEN ENGINEERING CORPORATION, INC. - Algonquin, Illinois

Projects and expertise provide for the investigation, analysis, evaluation, and management of electrical-related and materials-related product and process performance issues; including electrical arc fault incidences, electrical shock and electrocution incidences, electrical-related fire incidences, product liability issues, and intellectual property assessments and evaluations. Additionally, projects and expertise include the assessment of applied research, manufacturing process control and optimization, failure analysis of microelectronic components and processes, and product development programs in the power, telecommunications, transportation, and computer industries.

1998 - 2008 Packer Engineering, Inc. - Naperville, Illinois

Senior Vice President and Head of the Electrical Engineering Department responsible for performing and managing electrical-related accident investigations, electrical shock and electrocution issues, electrical-related fire investigations, product liability issues, intellectual property evaluations, applied research, manufacturing process analysis, failure analysis of microelectronic components and processes, and product development programs in the power, telecommunications, automotive, and computer industries.

1992 - 1998 Littelfuse, Inc. - DesPlaines, Illinois

Engineering Manager responsible for the direction of activities associated with the research/development, selection, application, and analysis of materials, products, and technologies incorporated into company operations and products. Led the efforts to develop and implement electrical circuit protection devices for the industrial, electronic, telecommunications, automotive, and computer industries.

1983 - 1988 Motorola, Inc. - Schaumburg, Illinois
Development Engineer responsible for the design and manufacturability of electronic technologies for industrial, telecommunications, and automotive applications.

ACADEMIC

Ph.D.	Northwestern University, Evanston, Illinois - Materials Science and Engineering (1992)
B.S.	University of Illinois at Urbana-Champaign - Electrical Engineering (1983)

AFFILIATIONS

Institute of Electrical and Electronics Engineers (IEEE)
American Society of Materials (ASM)
International Microelectronics and Packaging Society (IMAPS)
National Fire Protection Association (NFPA)

HONORS AND AWARDS

Tau Beta Pi - National Engineering Honor Society
Eta Kappa Nu - Electrical Engineering Honor Society
Sigma Alpha Mu - Materials Science Honor Society
Optical Society of America - Research Award 1989-1990
Newport Research Award - Research Award 1990-1991
Cabel Fellowship – Northwestern University 1991 - 1992

APPOINTMENT

Vice-Chairman, Planning and Zoning Commission; Village of Algonquin, IL

PUBLICATIONS and PATENTS

PUBLICATIONS

1. A.J. Neuhalfen and B.W. Wessels, "Photoluminescent Properties of Er-Doped $In_{1-x}Ga_xP$ Prepared by Metalorganic Vapor Phase Epitaxy," Appl. Phys. Lett. 59, 2317 (1991).

2. A.J. Neuhalfen, D.M. Williams, and B.W. Wessels, "Photoluminescent Properties of Yb-Doped InAsP Alloys," Materials Science Forum, edited by G.Davies, G.G.DeLeo, M.Stavola (Trans Tech Publications, Aedermannsdorf, Switzerland), vol. 83-87, p.689 (1992).

3. A.J. Neuhalfen and B.W. Wessels, "Electronic and Photoluminescent Properties of InP Prepared by Flow Modulation Epitaxy," Appl. Phys. 71, 281 (1992).

4. A.J. Neuhalfen and B.W. Wessels, "Rare-Earth Doped $In_{1-x}Ga_xP$ Prepared by Metalorganic Vapor Phase Epitaxy," Advanced III-V Compound Semiconductor Growth, Processing and Devices, edited by S.J. Pearton, D.K. Sadana, J.M. Zavada (Mater. Res. Soc. Proc., Pittsburgh, PA), vol. 240, p. 195 (1992).

5. A.J. Neuhalfen and B.W. Wessels, "Thermal Quenching of Er^{3+}-Related Luminescence in $In_{1-x}Ga_xP$," Appl. Phys. Lett. 60, 2657 (1992).

6. I.A. Buyanova, A.J. Neuhalfen, and B.W. Wessels, "Symmetry Properties of Er^{3+}-Related Centers in $In_{1-x}Ga_xP$ with Low Alloy Compositions," Appl. Phys. Lett. 61, 2461 (1992).

7. A.J. Neuhalfen, "Miniaturization of Circuit Protection Devices to Meet Surface Mount Applications," Surface Mount International Symposium Proceedings, p. 784 (1995).

PATENTS

1. Patent No. 6,043,966; March 28, 2000; "Printed Circuit Board Assembly Having An Integrated Fusible Link"

2. Patent No. 6,023,028; February 8, 2000; "Surface-Mountable Device Having A Voltage Variable Polymeric Material For Protection Against Electrostatic Damage To Electronic Components"

3. Patent No. 5,974,661; November 2, 1999; "Method Of Manufacturing A Surface Mount Device For Protection Against Electrostatic Damage To Electronic Components"

4. Patent No. 5,943,764; August 3, 1999; "Method Of Manufacturing A Surface Mount Fuse"

5. Patent No. 5,923,239; July 13, 1999; "Printed Circuit Board Assembly Having An Integrated Fusible Link"

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